

IN THE CLAIMS

Attached is a listing of the claims in accordance with the revised format of amending. Claims 14 and 22 have been amended.

1. (Original) A method of reconstructing tomography images comprising:
 acquiring data on the geometric coordinates of detection of individual radiation events;
 separately distributing a weight of each of the individual radiation events along a line of flight associated with the event determined from the acquired data on the geometric coordinates of detection of the individual event; and
 iteratively reconstructing the image based on the distributed weights.
2. (Original) A method according to claim 1 wherein the weights are distributed in voxels along the line of flight and wherein the weight of a particular event is distributed based on the probability that an event occurred in particular voxels.
3. (Previously Amended) A method according to claim 1 wherein the line of flight of an event is determined based on the position at which the event was detected on a detector and the acceptance direction of a collimator through which the detector receives radiation associated with the events.
4. (Previously Amended) A method according to claim 1 wherein the line of flight of an event is determined by the position on a detector on which the event is detected and the location of the source of radiation associated with the event.
5. (Previously Amended) A method according to claim 1 wherein the line of flight associated with an event is determined by detection of two coincident photons.
6. (Previously Amended) A method according to claim 1 wherein iteratively reconstructing the image comprises applying an iterative expectation maximization (EM) method on the data in sub-sets.
7. (Original) A method according to claim 6 wherein the individual events form the separate sub-sets.

- 19
8. (Previously Amended) A method according to claim 6 wherein the sub-sets are formed based on the time of acquisition of events.
 9. (Original) A method according to claim 6 wherein the sub-sets are formed from unrelated events.
 10. (Original) A method of reconstructing tomography images comprising:
 - acquiring data on the geometric coordinates of detection of individual radiation events; and
 - applying an iterative expectation maximization (EM) method on the data in sub-sets which are formed based on the time of acquisition of the data on the geometric coordinates of detection of the events.
 11. (Previously Amended) A method according to claim 6 or claim 10 wherein the subsets consist of data having less than a 180 degree view angle.
 12. (Previously Amended) A method according to claim 6 or claim 10 wherein iterations of the EM method are performed prior to the acquisition of data having a 180 degree angle of view.
 13. (Previously Amended) A method according to claim 6 or claim 10 wherein iterations are commenced on receipt of the first detected event.
 14. (Currently Amended) A method according to claim 6 or claim 10 comprising displaying an evolving image based on successive iterations of the iterative EM method on a display device.
 15. (Previously Amended) A method according to claim 6 or claim 10 and including determining if a study should be terminated based on the image quality of an image after an iteration.
 16. (Previously Amended) A method according to claim 6 or claim 10 wherein intermediate images are filtered with a smoothing filter between iterations of the EM method.
 17. (Previously Amended) A method according to claim 6 or claim 10 wherein intermediate images are filtered with a noise reducing filter between iterations of the EM method.

18. (Previously Amended) A method according to claim 6 or claim 10 wherein data is reused in subsequent iterations of the EM algorithm.

19. (Previously Amended) A method according to claim 1 or claim 10 wherein the image is a three dimensional image.

20. (Previously Amended) A method according to claim 1 or claim 10 wherein the iterative method comprises reconstructing from the events without forming two dimensional data sets.

21. (Previously Amended) A method according to claim 1 or claim 10 wherein the iterative method comprises reconstructing from the events without forming sinograms for slices of the three dimensional image.

22. (Currently Amended) A method of reconstructing tomography images comprising:
acquiring data on the geometric coordinates of detection of individual radiation events; and
iteratively reconstructing a three-dimensional image from the unbinned individual radiation events.

23. (Original) A method according to claim 22 wherein reconstructing the image comprises utilizing an expectation maximization (EM) method acting on individual unbinned events.

24. (Previously Amended) A method according to any of claims 1, 10 or 22 wherein the radiation events are nuclear emission events and the images are emission tomography images.

25. (Previously Amended) A method according to claims 1, 10 or 22 wherein the radiation events are positron decay events and wherein the images are PET images.

26. (Previously Amended) A method according to claims 1, 10 or 22 wherein the radiation events are represented by photons which have passed through a subject and wherein the images are transmission tomography images.

27. (Original) A method according to claim 26 wherein the radiation events are nuclear disintegrations and wherein the images are nuclear transmission tomographic images.

28. (Original) A method according to claim 26 wherein the radiation events are X-rays and wherein the images are X-ray CT images.

29. (Previously Amended) A method according to any of claims 1, 10 or 22 wherein the line of flight associated with the radiation events form a fan beam.

30. (Previously Amended) A method according to claims 1, 10 or 22 wherein the lines of flight associated with the events form a cone beam.

31. (Original) A method of reconstructing positron emission tomography (PET) images comprising:

acquiring data on the geometric coordinates of detection of individual positron emission tomography events utilizing a plurality of spatially continuous area detectors; and

reconstructing the image utilizing an expectation maximization (EM) method acting on individual unbinned events.

32. (Previously Amended) A method according to claim 31 wherein the spatially continuous detectors are substantially planar detectors.

33. (Original) A method of reconstructing positron emission tomography (PET) images comprising:

acquiring data on the geometric coordinates of detection of individual positron emission tomography events utilizing a plurality of substantially planar area detectors; and

reconstructing the image utilizing an expectation maximization (EM) method acting on individual unbinned events.

34. (Original) A method according to any of claims 31-33 wherein the plurality of detectors consists of two such detectors.

35. (Previously Amended) A method according to any of claims 31-33 wherein the images are three dimensional images.